

PROCEEDINGS
OF THE
GENERAL MEETINGS FOR SCIENTIFIC BUSINESS
OF THE
ZOOLOGICAL SOCIETY OF LONDON.

PAPERS.

1. The Fauna of East Africa and its Future.
By C. W. HOBLEY, C.M.G., C.M.Z.S.

[Received October 17, 1921 : Read February 7, 1922.]

I have been asked by the Secretary to give some of my impressions of British East Africa, which is now known as Kenya Colony.

I am naturally diffident in addressing a learned society like this, and my only claim to attention is that there are probably few present this evening who have had such a long experience of the country of which I propose to speak. My connection with East Africa began in 1890, and since that time I have served continuously in the Uganda Protectorate and British East Africa, and have during the whole of that period been a keen observer of the fauna of the area, so have naturally chosen that subject for my remarks this evening.

The country has been so often described in books of travel and sportsmen's records of slaughter, that any general description is unnecessary. I therefore propose to confine myself to a few remarks on the fauna based on personal observation.

I was fortunate enough to be able to travel in the country when it was in what may be termed the exploration stage; that is to say, before the advent of any European settlement and the consequent disturbance of natural conditions. Needless to say, game was far more numerous over the whole country, but particularly in the favoured areas (*i. e.*, the great plains) in those days than it is to-day; and on looking back and trying to compare

the stock of game in the country as a whole to-day with that in say 1895, probably the present stock would only represent 15 per cent. to 20 per cent. of the former: this is, however, only to be expected when one considers that upwards of 6000 square miles of land, most of it game country, has been alienated to colonists.

I am not complaining, for it cannot be expected that fertile lands which will provide homes for people of our race and grow products essential to civilization, will remain for ever in the possession of wild game.

I will, however, revert to the question of the future of the game later on, and now propose to recall the conditions which prevailed 20 years ago before man took a hand in the matter, *i. e.* to any great extent.

At that time the areas noted for great profusion of game were the Athi and Kapiti Plains, the Yatta Plateau, the Serengeti Plains, the Loita Plains, the Rift Valley, and the Uasingishu Plateau. A portion of the Kapiti Plains and the Loita Plains are included in the game reserves, so presumably carry a good stock in places, but all the other areas are decimated, mostly owing to the effect of settlement.

The main factors which determined the distribution of game in the early days were yearly variations in rainfall which resulted in a sufficiency or insufficiency of grazing in particular areas; epidemic diseases also periodically affected certain species, and the number of carnivores also counted. All these factors operate at present, but the first mentioned, *viz.*, the variation in rainfall, operates more harshly than formerly, for nowadays the area over which the game can migrate in search of grazing is restricted. If, for instance, the Southern Game Reserve is seriously affected by drought, large numbers of game are doomed; some may attempt to migrate into the farm lands, but many are shot down, and the survivors retreat to the reserve where the grazing is finished and many of the water-holes dry. A good example of this occurred in 1910, when the plains were so dry that zebra and hartebeest came up in force into the town of Nairobi, regardless of man, in their search for water; the lions followed them and killed game nightly in the open land in the centre of the town. Natives and others killed many of the invaders, and the emaciated remnant was driven back to the plains.

Speaking of epidemics, one of my earliest recollections in East Africa was the great rinderpest visitation of 1891. I was then exploring the course of the Tana River, and the buffalo were coming down to that river literally in thousands to die. The bush country fringing the Tana between Hamaye and Mumoni is not ideal buffalo country, for the grazing is not too plentiful at any time, but once they contracted the disease they appeared to be impelled to seek water, doubtless coming from great distances to the river, and I estimate that in the stretch of country above mentioned, a distance of about 80 miles, we saw several thousand buffalo in all stages of disease and death, attended by vultures and

marabou storks in myriads, all gorged to repletion. Occasionally dead giraffe, waterbuck, and bush buck were seen; the eland also suffered, and I am told that kudu and roan were also attacked.

From the buffalo the disease spread to the cattle, and at Ngomeni in North-East Kitui, which was a great cattle centre before the epidemic, we were shown some 20 odd beasts, the sole survivors of many thousand head, and the desiccated carcasses of the victims were piled up as a wall outside the villages.

It was during that journey that we happened to follow a day behind a large *impi* of Laikipia Masai which was engaged in raiding the Embu and Mbe tribes. I will not dwell on the evidences of ruthless slaughter we witnessed, but some fifteen years later I was recalling the incident to the chief of the Laikipia Masai, and he laconically told me that he was a "morán" or warrior at the time and had participated in the raid; he parenthetically added that it was an unfortunate venture, for some of the captured cattle were infected with rinderpest, and so they took the disease back to their own herds on Laikipia and practically all perished. Nemesis indeed!

This outbreak was the worst epidemic known in the recent history of Africa; it spread rapidly south through what was then German East Africa, crossed the Zambezi, reached Buluwayo about 1895, and by the end of 1896 it had reached the Cape. During the last year of the visitation its progress was remarkably rapid, viz., about 1000 miles; it was probably spread to a great extent by the transport riders. Since that devastating attack we have had minor epidemics of the disease; in 1904 I saw eland dying of it near Naivasha, and the Masai then lost over 600 head of stock. Although sporadic outbreaks still occur, this disease is now well in hand.

In very dry years, when grazing is scarce and the plains are very dusty, outbreaks of anthrax occur among the game, the principal species to suffer being Coke's hartebeest; the last serious outbreak which was identified was in 1905, when several thousand head of game died on the Athi Plains.

Pleuro-pneumonia is rarely absent from the herds of Masai cattle grazing in the South Reserve; but, curiously enough, there is no record of the disease attacking the game, and the Game Warden has stated that cases are known where eland and buffalo graze over the same land as cattle infected with this disease and are apparently unaffected.

About 1906 an epidemic of what is believed to be distemper broke out among the jackals on the Athi Plains, and large numbers died; a year or two later the same disease was recorded from the Rift Valley, and then from Laikipia. It is not, however, known whether the disease is endemic, or whether it has been introduced by civilization.

Wild game is in some areas infected to a considerable extent with intestinal parasites. I have frequently observed the intramuscular cysts of what is commonly called "measles" in mpala,

Grant's gazelle, and hartebeest. The health of the host appears to be unimpaired.

Taking it all round disease is rare among game and serious epidemics are uncommon; as Mr. Percival has pointed out, the reason is that directly an animal becomes sick it either leaves the herd or is driven out, and being alone and dull with sickness it more readily falls a prey to one of the killers or one of the scavengers; next day the vultures complete the story, and very little is left to form a breeding ground for the flies which are the great disseminators of disease.

It would take far too long to attempt to deal with each species of the various game animals in the part of Africa with which I am acquainted, and so much has already been written by others. I will, however, venture to refer to one or two of particular interest.

ELEPHANT.—First comes the elephant. The numbers of elephant have greatly decreased during the last thirty years, for apart from the European sportsmen from overseas, the residents in the country have accounted for a large number; further, the improvement in communications has indirectly led to a greater amount of illicit slaughter. It is true that game laws have been in force in British East Africa and Uganda for about twenty years and administered by a keen staff, and the ports have been carefully watched; but a great deal of ivory has nevertheless been smuggled out over our land frontiers both to the north and south, and without heavy expenditure this was impossible to check. There are certain small tribes like the Dorobo and Sania who are professional hunters, and many of the Eastern Akamba are great offenders. A native with a few tusks has up to now had no great difficulty in disposing of them to some itinerant Arab, Baluchi, or Somali trader who was wandering about ostensibly trading in hides, and Indian traders could always be found to finance such undertakings.

The elephant endangers itself by conservatism, for it is a beast of very regular habits; at certain seasons it invariably seeks certain localities, and it is interesting to map out the lines of migration.

Generally speaking, in the hot dry season it seeks the shelter of the high forests, and in the rains treks to more open country; native hunters say that the perpetual drip from the trees in the forest is distasteful to it. Elephants in the Kilimanjaro region, for instance, move down the northern flanks of the Usambara Range about April and spread out through the Nyika Plains almost to the coast, one of the attractions there being the ripe fruit of great groves of *Hyphæne* palms.

Similarly, another herd migrates each year from the same region and marches east, crossing the Uganda Railway near Kinani and on eastward across the Athi into Southern Kitui.

For many years past, about June, a herd of elephants has come

down to the sea north of Kilifi and has spent a month or so wandering about and feeding in the thorn bush near Malindi. The herd may be the one referred to from Kilimanjaro, or it may come from the Middle Tana or even from the Lorian.

Every year a herd of elephants was wont to descend from the Aberdare range to the Rift Valley between Naivasha and Longonot Mt.; this herd has, I think, been obliterated. Other lines of migration were across South Laikipia from the Aberdares to Kenya and then north-east towards Lorian*. Still other herds migrated from the Aberdares northwards, passing east of Baringo towards Mount Nyiro.

Elephants from the Mau forests also yearly come down to the high grass country in the Lower Nyando Valley, and others annually frequented a swampy valley at the foot of Gwasi Mount.

The main routes of these migrants were so well marked, and they followed practically the same roads year after year and about the same month, that a native hunter's task was easy.

These elephant roads are in certain places striking features; on the east side of Ol Bolossat Lake they can be seen climbing diagonally up the flank of the escarpment, and form uniformly graded roads about 8 feet wide. On the summit of Mau there are other roads originally elephant tracks but later on widened out and deepened by mobs of Masai cattle, and about which some imaginative people have tried to force the opinion that they are the relics of an ancient highway from Egypt to Zimbabwe.

Hearing that considerable stocks of old ivory were in possession of the natives, some years ago the local government instituted the practice of buying in ivory at half the market value; this resulted in the production of a large amount of old ivory but also of a large number of tusks mostly derived from immature beasts. Recently most of the ivory brought in has been obviously obtained from animals killed fairly recently, but often camouflaged to resemble old ivory.

It is very noticeable, however, that during the last ten years, in consignments of confiscated or purchased ivory, the average weight per tusk has decreased, and old big tuskers are now, I believe, very scarce. The future of the elephant may therefore be said to be precarious—he will not stay in any reserve; the inherited instinct with which he makes his annual migrations will, I fear, cause his disappearance, although there may for many years to come be vast areas wherein he could live in reasonable safety.

LION.—A few words regarding the lion. This beast is in no danger of extinction. As is well known, cats are very prolific, and

* From the Lorian swamp the migrant herds pass N.W. to Marsabit and then southwards back to the Aberdares, a round trip of well-nigh 400 miles. The well-known hunter naturalist Mr. R. J. Cuninghame informs me that this journey from the Aberdares back to the Aberdares is believed to take three years, for herds have been identified leaving the forests on the above mountains without calves and returning to the same place three years later with calves of about a year old. The favourite breeding place is said to be Marsabit forest.

as long as the reserves are maintained and contain any game, so long will there be lions; in fact, a reasonable supply of lions is, I consider, a *sine qua non* in a reserve, for they clear off the weaklings and the sick, forming part of nature's scheme in a natural assemblage of animals mainly composed of herbivores. Curiously enough, however, during the war they increased out of proportion, for although an enormous amount of game was shot by the troops, the lions were not hunted to any extent.

The result of this was that game being scarce in the area of military operations, numbers of lions became cattle eaters, and the Masai herds which tenant the Southern Game Reserve have suffered heavily; I believe that the Game Department has had to take steps to reduce the number of lions there during the last year or two. It is not easy to understand what normally limits the number of lions; one never sees a lion which has died of starvation or disease, and lions which are shot always appear to be in a fair condition, but some cause undoubtedly does operate in a natural assemblage to preserve the proportion of carnivores to herbivores.

Considerable troops of lions are sometimes seen, but it is rare. Sir Frederick Jackson recorded a troop of 23 near Lukenya; the largest troop I have seen myself was 11, made up of 1 male, 4 females, and 6 half-grown cubs, near Ngong, where I watched the adults opened out in echelon on a hillside, hunting a herd of zebra, the cubs being assembled under a tree watching the performance, and doubtless learning the art.

Lions have now been well-nigh abolished in the older settled areas and necessarily so, for no one can successfully farm stock in a country where lions are common. There are still, however, but few places where domestic stock could safely be allowed to stay out in a pasture all night.

RHINOCEROS.—This curious beast has suffered severely of recent years, and great numbers have been killed. The greater proportion inhabited the open plains and were thus conspicuous to sportsmen. They have irritable natures and have a stupid habit of charging down on anything that annoys their sense of smell. In hundreds of cases this has induced their death, for many a man has had to shoot a rhino in self-defence. I have myself had several narrow shaves owing to their sudden attacks.

Many were killed during the war in the southern portion of the Game Reserve by the troops of both forces.

The high price which rhino horns have commanded in the Far East during the last few years has, moreover, proved an inducement to the native hunters to slaughter these animals; they were instigated by the Indian traders, who surreptitiously shipped them out in considerable quantities.

This beast does not make long migratory journeys, and, providing that the reserves are of ample size and contain an adequate

supply of the acacia scrub which forms its diet, and water, there is no reason to fear its extinction.

BUFFALO.—After the big rinderpest epidemic it was feared that these fine beasts were practically extinct, and for some 20 years or so they were undoubtedly rare.

They have, however, gradually increased in certain areas, and no anxiety need now be exercised as to their extinction. There are, it is believed, considerable numbers in the Southern Reserve, on the northern stretches of Laikipia, in Southern Kitui, and various other places.

A considerable number also frequent the coastal area where the bush is very thick, and up to recently a few even annually visited the mainland opposite Mombasa town, but left the spot when the bush was cleared to make a plantation. In the spring of 1919 about half a dozen visited the place they knew, but finding no cover they retreated into the interior; one, however, swam across the mouths of the two harbours and landed on the mainland south of the island, a distance of over half a mile.

In the old days buffalo could be seen in the early part of the day and in the late afternoon grazing out in the open like herds of cattle, but since the epidemic this is very rarely the case. They now live in dense bush, only coming to graze in the open at night, retiring to the bush again at dawn. Possibly now there are fewer of them they have lost the confidence they formerly possessed.

The geographical range of the buffalo is remarkable, for, as I have remarked, they frequent the hot coast-lands, and then, again, a desiccated buffalo carcase is recorded from the foot of a glacier on Mount Kenya. As might be expected, the animals inhabiting the higher altitudes have thicker coats than those at the coast.

HIPPOPOTAMUS.—This beast is decreasing at a great rate; in the old days the middle and upper Tana swarmed with them, but now not more than 5 per cent. survive. The same applies to the Athi River; they have also greatly decreased in Lake Victoria and in other smaller lakes.

Unfortunately the Game Reserves do not contain much water suitable for them, but it will be a long time before they disappear from the swampy bays on Lake Victoria, and from some of the more remote rivers, such as the lower course of the Nyiro which flows into the Lorian Swamp.

GIRAFFE.—The area occupied by this fine beast is becoming more restricted every year, and the settlement of the Usingishu plateau will probably settle the fate of the beautiful subspecies which is found there, for the Dutch colonists find it hard to refrain from slaughtering them, as giraffe hide has a peculiar quality

which makes it valuable for *reims*. There are, however, a good number of the common species in the Southern Reserve, and one can frequently see a herd from the mail train on the Uganda Railway near Sultan Hamud Station.

WILDEBEEST.—In former times there were vast numbers of these beasts to be seen, and in the spring of 1896 I saw an enormous herd, which I estimated at nearly 10,000 head, migrating northwards along the Athi Valley on the east side of where Athi River Station now stands. The species is, however, in no danger of extinction, for there are still a considerable number in the Southern Reserve and on the Loita Plains.

I will now add a few words regarding the vagaries of geographical distribution of some of our game species, and the difficulty of ascertaining the laws that govern it.

I will give the following examples:—

1. **SABLE ANTELOPE.**—This species is found from the border of Tanganyika Territory near the coast and inland for about 20 miles, then very sparsely northwards to the Sabaki River, where it ceases. In fact, it is extremely rare north of the Uganda Railway. It is not found anywhere else in Kenya Colony or Uganda.

2. **WILDEBEEST.**—In the plains near Kilimanjaro through the Southern Reserve up to the neighbourhood of Donyo Sabuk this abounds: it stops abruptly at the Thika River. Farther west it is found to a small extent in the southern portion of the Rift Valley, but never extended northwards along that valley farther than the Lower Kedong Valley, although the plains immediately to the north abounded in grass and water. West of the railway the wildebeest favours the Loita Plains; in that area, however, it was shut off from extension to the north by the Mau Forest.

3. **ROAN.**—The distribution of this antelope is very capricious. It is said to be sporadically found near the coast, but is very rare, and I have never seen it there. It is found on the big range of hills west of Sultan Hamud, and on the foot-hills of the Ukamba Range to the east of that place. Then there is apparently a gap, for I have not heard of its occurrence again until we come to the Nyando Valley about 30 miles east of Kisumu. Sir Frederick Jackson also mentions its occurrence near the Turkwell River. It is, however, nowhere a common beast. Odd specimens may yet turn up in unexpected places.

4. **TOPI.** *Damaliscus senegalensis*.—The distribution of this antelope is worthy of attention. On the coast it is fairly common between Malindi and Lamu, and some say that it is found farther south near Vanga. Jackson states that it does not occur south of the Sabaki, but I saw a few N.W. of Rabai. Proceeding inland

there is an enormous gap, for we do not find it again until we come to the Uasingishu Plateau, which is about 6000 ft. above sea-level. This is an unexplicable hiatus. I have not, however, had an opportunity of comparing Uasingishu skins with specimens from the coast, so cannot testify to their absolute identity.*

5. WALLER'S GAZELLE.—This species is another example of intermittent distribution. It is found on the steppes on the east or left bank of the Tana River below Hamaye and extends northwards to Somaliland. Then there is a great gap, for no trace of it is seen until we reach the neighbourhood of Lake Magadi, a distance of 200 miles; a few are also found on the Serengeti Plains, principally to the north of the Voi-Taveta Railway line. It is also believed to exist in Usambara district in Tanganyika Territory, but this is its southerly limit.

6. HARTEBEEST.—The common hartebeest of the country is Coke's, and, as a rule, whenever a square mile or two of open country occurs we get this ubiquitous beast. It is locally called the "Kongoni." A curious thing happens in the Rift Valley; at the south end of the Rift Valley in Kenya Colony all the hartebeest are *cokei*, but about the north end of Naivasha Lake nearly every hartebeest seen belongs to the Neumann's variety, and as we go farther north and west we find this gives way to the curious Jackson's variety, and on the Uasingishu Plateau there is no species of the hartebeest other than Jackson's. This, of course, is not so much a question of the distribution of one species as a change of one species, and the variations of the Grant's Gazelle and the Oryx in different areas could similarly be traced.

These facts of erratic distribution are difficult to understand, and to find an adequate explanation I am inclined to believe that we shall have to go back to the time when the progressive desiccation of this portion of Africa set in.

This question of desiccation cannot be discussed here at any length. I have collected a considerable amount of evidence regarding it which was published in the 'Geographical Journal,' November 1914. The causes are by no means clear, but certain meteorologists have advanced the opinion that during the glacial period of Europe there was a much greater rainfall in the areas to which the glaciers did not extend. At any rate, there is clear evidence that in Pleistocene times or thereabouts the glaciers of Kenya extended some 5000 ft. below their present terminations, viz., to about 9000 ft. above sea-level, and on Ruwenzori glacial deposits are, it is stated, to be found at the surprisingly low altitude of 5000 ft. above sea-level.

Now the greater rainfall during that period, which only decreased gradually through a long term of years, must have resulted in a marvellous expansion of the forest area; the high-level flora

* The topi is also common on the Loita Plains and southwards on the same meridian of Longitude into Tanganyika Territory.

would extend over a much larger area, and the low-level forest assemblages would extend over thousands of square miles now only tenanted by dwarfed trees of species which can survive the long droughts. Consequently the areas of open grass lands so necessary to many species would be restricted.

All this must have had a profound effect on the wild game of those times and on its distribution. The low forest, for instance, now only survives in a few favoured spots such as the delta of the Lunni River near Taveta, the banks of the Tana, and on a few isolated areas near the coast, but traces of its existence are to be found over a great extent of country, and these remnants are evidence of its greater extension.

Piecing together the few facts I have quoted regarding distribution, I premise that Kenya Colony may be looked upon as the junction or the termination of three zoological areas:—The West Coast area, the Somaliland area, and South-East African area. The West Coast area officially terminates at Ruwenzori Mountain, but traces of its fauna are still found far east of that mountain, in country which they invaded during the period of maximum afforestation before referred to, a variety of the West African potto (*Perodicticus*) being found as far east as Kakumega Forest, which is 50 miles east of Lake Victoria. The bongo is also a West African type, the butterflies of Kavirondo and West Nandi also contain many West African types, and the grey parrot of W. Africa comes as far as the Nandi Forest, and is very occasionally seen as far east as Kikuyu.

As regards the Somaliland fauna, I look upon Waller's gazelle as the type-species illustrating the invasion from the north, it is quite common on the north and east side of the Tana, but much rarer at its southern limit; Grévy's zebra is another example, and possibly the lesser kudu. The greater kudu is a puzzle because it is fairly common in parts of Somaliland, and common in parts of South Africa, but very rare in Kenya.

With regard to the South-East Africa area, the sable antelope undoubtedly worked its way up the East coast from Portuguese East Africa, and I am inclined to believe that the wildebeest also came north from South Africa, developing new characteristics on the journey.

The original focus of distribution of the bubalines, which include the various forms of hartebeest, is very difficult to settle, but they possibly originated and split up into varieties in this area, for more hartebeest probably exist in it than in any other, and the forms are more numerous.

GAME AND DISEASE.—Although, of course, there are many keen sportsmen in the Colony, there is a strong local feeling against wild game among a section of farmers, who believe that it spreads the tsetse-flies and thus increases the area affected by trypanosomiasis. They again argue that game fosters the supply

of ticks and forms a reservoir for East Coast fever, etc. They thus urge the extermination of all the game.

The tsetse-fly has probably restricted the settlement area, but up to the present there has been no dearth of land free from this insect. To what extent the tsetse depends for its perpetuation on wild game is not quite clear. I, personally, saw more tsetses than anywhere else in a bush area on the coast where hardly any game existed; then, again, there are tsetse-haunted areas on the Kerio River where the Turkana tribe herd large numbers of donkeys and camels with impunity. The bionomics of this insect need still more investigation, and it does not necessarily follow that all the representatives of the genus *Glossina* carry the disease.

The tick question in Africa is really one of more importance, and why some areas literally swarm with these Arachnids, while others are but sparsely supplied, is a mystery. I do not know if it is anything more than a coincidence, but I have noticed that the areas covered with black cotton soil contain far more ticks than the sandy soils or red soil areas. The black soil cracks a good deal in the dry season, and it is possible that these cracks may form shelters for some of the ticks when the grass is fired, whereas in other areas the greater portion of the ticks are annually destroyed by fire.

The Athi and Kapiti Plains swarm with ticks, and the soil there is a black clay formed by the weathering of the underlying sheet of phonolite, and which opens out into deep cracks during drought. The Rift Valley soil is a light powdery volcanic dust, and ticks are by no means plentiful. In the light soil of the coastal region ticks are also not very numerous.

There is no doubt that wild game is tolerant of the parasites which cause diseases such as East Coast fever and Redwater fever in cattle, and there is little doubt that the ticks become infected by biting these hosts; further, it is alleged that a tick can engorge itself once in each of its three stages of existence, also that in most cases when a tick engorges on an animal it cleans itself—that is to say, its internal parasites, if any, are discharged into the mammal upon which it feeds. Presumably if this animal is already infected the tick absorbs a new crop of parasites with its blood.

It is also alleged that it has been proved that in some cases ticks hand on their parasites to their progeny. It will therefore be seen that the problem is fairly complex.

The veterinary authorities in East Africa and South Africa have done a good deal of work on the subject, but it appears to me that further investigation is necessary before we can be dogmatic on these difficult questions.

It must, moreover, also be borne in mind that if the big game is exterminated in an area, there will always remain a supply of ground game also presumably tolerant, which may keep the disease parasites alive.

The abolition of the tick is, I fear, impossible; on a fenced farm frequent dipping of the cattle apparently does greatly reduce the population of ticks within the fenced area, but of course dipping is impossible with wild game.

At any rate, the wild game is incriminated as regards the spread of disease to domestic animals, and there is strong evidence as to its guilt, particularly as regards East Coast fever and Redwater disease of cattle; canine tick fever is another case in point.

GAME RESERVES.—The Game Reserves in Kenya are not tenanted only by the wild game, for they are also occupied by certain native tribes.

The Southern Reserve contains the Masai tribe with its huge flocks and herds; the Northern Reserve contains a sparse population of Suk and Samburu people.

The Masai do not hunt or kill wild game to any great extent; they probably kill a few buffalo in order to get hides for their shields, and they also kill a few lions. In this way they are not detrimental to the game; their young men are useful, too, as game scouts. During normal years matters adjust themselves, but in periods of drought, when grazing is scarce and water scarcer still, the game has to take second place to the Masai stock, and there is little doubt that the game suffers.

It is not usually so much shortage of grass as shortage of water, for wild game can graze farther from water than cattle, and the question of increasing the water storage of the reserves should be carefully gone into, and works carried out. The Masai would probably contribute to the cost, as the area has been dedicated to their use, and they are looked upon as having the first claim on it; presumably if they decided to kill all the game there as being detrimental to their grazing rights, it might be argued that they were legally entitled to do so; this is, however, an academic point at present.

The Northern Reserve is mostly arid desert, and it receives little attention from any one; it is rarely patrolled by the Game Department, for a large portion of it is not too safe at present. A few favoured spots such as Marsabit and Mt. Nyiro are the haunt of elephants, buffalo, and probably kudu; Grevy's zebra is also found in this part of the Colony.

GENERAL.—The wealth of wild game with which nature has endowed East Africa should, I think, be viewed as a national trust to a greater extent than it is at present. In Kenya itself efforts as regards its preservation are looked upon as being reactionary, and the Game Department is too apt to become a cockshy for the local politicians, and only tolerated because it brings in a little more revenue than is spent upon it.

Before the war big game sportsmen spent many thousands annually in the country, and afforded employment to a con-

siderable number of Europeans and natives; further, the income from licenses averaged over £10,000 per annum.

It is, however, parochial to assess the value of the game on these lines, and I feel sure that our American friends do not measure the value of their fine reserves in terms of dollars.

In my view the wonderful fauna of our East African possessions does not solely belong to the people who happen to settle there, and who somewhat reluctantly vote a minimum amount per annum for its preservation—it belongs to the Empire—and should not be entirely at the mercy of local interests.

Of course, as I said before, settlement must go on and full consideration must be given to the economic interests of the colonists, and sympathetic attention to complaints regarding the depredations of game, as well as the question of game and cattle diseases. Generally the relations between the Game Department and the colonists require great tact and judgment.

I believe that a proposal to reduce the game reserves materially would have to obtain the Secretary of State's approval, but presumably he would follow the recommendations made by the Governor at the time, and that officer's views might be coloured by the limited view of his Legislative Council, and therein is the danger.

I should like to see a Committee selected from the Council of this Society and the Council of the Society for the preservation of the fauna of the Empire duly recognised by the Home Government as the official advisers on the question of game preservation in East Africa, and on the policy of the Game Departments in the various Crown Colonies and the mandatory territory of Tanganyika.

If this could be brought about I feel sure that a more scientific treatment of the question would ensue.

I am loth to introduce any personal note, but will venture to record that the present Game Warden of Kenya is devoted to the game in his care, and has an unrivalled field naturalist's knowledge of the fauna of the country; he, moreover, does all that is possible with the limited staff at his disposal. He would probably be extremely thankful to receive support from a body of great weight outside the country; such support could not fail to strengthen his hands, and to give him greater confidence in his efforts.

I, however, strongly desire to urge that the whole outlook should be reviewed on a scientific basis, and that the bionomics of the fauna be given greater prominence. Up to now what may be termed a hand to mouth policy has been the vogue. It is true that the various Governors have been more or less interested in sport, and have generally supported game preservation, but no one knows whether a Governor might appear whose policy would render nugatory any systematic game preservation.

Much, moreover, requires to be done if the Reserves are to be

made permanent sanctuaries for the big game. An improvement of the water-supply will, for instance, do a great deal to anchor the game to their Reserves.

The fencing of the portion of the Game Reserves which abuts on the settled areas will eventually have to be undertaken, and this is a serious matter, for it will cost a considerable sum to erect, and annual sums for maintenance.

The relation of the tsetse-fly and ticks to game needs further investigation by trained observers, and it is, I think, important that a biological station should be founded in the main Reserve with a research zoologist in charge, and this should be the centre for detailed investigation into the life-history of the game animals, the problems of distribution, the diseases of game, and the bionomics of insect life, with particular attention to the tsetses and ticks. Attention should also be given to locust extermination, for the destruction of large areas of grazing by these insects profoundly affects the game, and when the locusts spread to the farms, they lead to losses and consequent grievances. For a similar reason attention should be directed to the destruction of the myriads of larvæ of a butterfly, of the genus *Belenois*, which periodically destroys large areas of grazing in the Reserves and elsewhere.

The Game Department should officially photograph the game in their natural haunts, both by telephoto apparatus and film cameras; the rangers have opportunities of seeing game under conditions denied to most. A series of photographs would form a very valuable record, and also prove of service for educational purposes. The Department should also collect from time to time series of heads of the various species for our national collections, and a complete reference collection for the local museum. The lesser fauna and the avifauna should also be collected for reference and study—the field is very wide.

With proper arrangements and funds the Department could also supply the Society with live specimens to fill its gaps. The Department at present is so limited in personnel that it almost entirely confines its energies to the game-keeping side, *i.e.*, the prevention of poaching, doubtless an important duty; but more stress requires to be laid on observation, and the collection of accurate scientific data regarding the fauna.

In the past, vacancies in the Game Department have been filled in somewhat haphazard fashion from local applicants. This practice is, I believe, a mistake, and it is impossible to obtain scientific data if it is continued. Here, again, this Society might ask to be allowed to act as a selection board to see that only men with the necessary zoological and biological qualifications were appointed to the Game Departments in this group of territories.

It will, I think, be allowed that the whole question of the future of the game in East Central Africa is one of great interest,

whether viewed from the point of view of the zoologist and naturalist, or from that of a great national asset.

The problem is one of some complexity. On one side we have the interests of an increasing number of settlers who have in many cases invested their all in their farms, and who cannot be ignored; for as time goes on they are steadily acquiring the right to decide the future fate of the country in which they have settled. On the other hand, we still have in our trust a wealth of wild fauna such as exists nowhere else in the world to-day; similar conditions ruled in other parts of Africa, but in most areas the game has been well-nigh annihilated by the advance of settlement. In Kenya Colony the conditions are not quite analogous, for here we have large areas not suited for white settlement, and if game can be definitely confined in those areas by the conservation of adequate water and grazing, and later by the addition of fencing, the solution of the problem is in sight.

The question is how this state of affairs can be brought about, and that is where I venture to hope that this Society and also the Society for the preservation of the fauna of the Empire may be able to play a great part.

I do not propose to pose as an alarmist, but having had the opportunity of watching the growth of the country for many years, I consider that the interests of the wild-game fauna are in a precarious condition, and therefore crave no excuse for urging that more interest should be taken in its future by the zoologists of this country.